

---

**Sunshine**

**ReenigneArcher**

**Feb 21, 2023**



# ABOUT

<b>1</b>	<b>Overview</b>	<b>1</b>
1.1	About . . . . .	1
1.2	System Requirements . . . . .	1
1.3	Integrations . . . . .	2
1.4	Support . . . . .	2
1.5	Downloads . . . . .	2
1.6	Stats . . . . .	2
<b>2</b>	<b>Installation</b>	<b>3</b>
2.1	Binaries . . . . .	3
2.2	Docker . . . . .	3
2.3	Linux . . . . .	3
2.4	macOS . . . . .	7
2.5	Windows . . . . .	8
<b>3</b>	<b>Docker</b>	<b>9</b>
3.1	Important note . . . . .	9
3.2	Build your own containers . . . . .	9
3.3	Where used . . . . .	10
3.4	Port and Volume mappings . . . . .	10
3.5	Supported Architectures . . . . .	11
<b>4</b>	<b>Third Party Packages</b>	<b>13</b>
4.1	AUR . . . . .	13
4.2	Chocolatey . . . . .	13
4.3	nixpkgs . . . . .	13
4.4	Scoop . . . . .	13
4.5	Solus . . . . .	13
4.6	Winget . . . . .	14
4.7	Legacy GitHub Repo . . . . .	14
<b>5</b>	<b>Usage</b>	<b>15</b>
5.1	Network . . . . .	16
5.2	Arguments . . . . .	16
5.3	Setup . . . . .	16
5.4	Shortcuts . . . . .	19
5.5	Application List . . . . .	19
5.6	Considerations . . . . .	20
5.7	HDR Support . . . . .	20
5.8	Tutorials . . . . .	21

<b>6</b>	<b>Advanced Usage</b>	<b>23</b>
6.1	Performance Tips . . . . .	23
6.2	Configuration . . . . .	23
6.3	General . . . . .	24
6.4	Controls . . . . .	25
6.5	Display . . . . .	27
6.6	Audio . . . . .	30
6.7	Network . . . . .	31
6.8	Encoding . . . . .	34
6.9	Advanced . . . . .	45
<b>7</b>	<b>GameStream</b>	<b>47</b>
7.1	Migration . . . . .	47
7.2	Limitations . . . . .	47
<b>8</b>	<b>General</b>	<b>49</b>
8.1	Forgotten Credentials . . . . .	49
8.2	Web UI Access . . . . .	49
8.3	Nvidia issues . . . . .	49
<b>9</b>	<b>Linux</b>	<b>51</b>
9.1	KMS Streaming fails . . . . .	51
<b>10</b>	<b>macOS</b>	<b>53</b>
10.1	Dynamic session lookup failed . . . . .	53
<b>11</b>	<b>Windows</b>	<b>55</b>
11.1	No gamepad detected . . . . .	55
<b>12</b>	<b>Build</b>	<b>57</b>
12.1	Building Locally . . . . .	57
12.2	Remote Build . . . . .	57
<b>13</b>	<b>Linux</b>	<b>59</b>
13.1	Requirements . . . . .	59
13.2	CUDA . . . . .	62
13.3	npm dependencies . . . . .	63
13.4	Build . . . . .	63
<b>14</b>	<b>macOS</b>	<b>65</b>
14.1	Requirements . . . . .	65
14.2	npm dependencies . . . . .	65
14.3	Build . . . . .	66
<b>15</b>	<b>Windows</b>	<b>67</b>
15.1	Requirements . . . . .	67
15.2	npm dependencies . . . . .	67
15.3	Build . . . . .	67
<b>16</b>	<b>Contributing</b>	<b>69</b>
<b>17</b>	<b>Localization</b>	<b>71</b>
17.1	CrowdIn . . . . .	72
17.2	Extraction . . . . .	72

<b>18 Testing</b>	<b>75</b>
18.1 Clang Format . . . . .	75
18.2 Sphinx . . . . .	75
18.3 Unit Testing . . . . .	75
<b>19 Legal</b>	<b>77</b>
19.1 Commercial Use . . . . .	77



## OVERVIEW

LizardByte has the full documentation hosted on [Read the Docs](#).

## 1.1 About

Sunshine is a self-hosted game stream host for Moonlight. Offering low latency, cloud gaming server capabilities with support for AMD, Intel, and Nvidia GPUs for hardware encoding. Software encoding is also available. You can connect to Sunshine from any Moonlight client on a variety of devices. A web UI is provided to allow configuration, and client pairing, from your favorite web browser. Pair from the local server or any mobile device.

## 1.2 System Requirements

**Warning:** This table is a work in progress. Do not purchase hardware based on this.

### Minimum Requirements

GPU	AMD: VCE 1.0 or higher, see <a href="#">obs-amd hardware support</a> Intel: VA-API-compatible, see: <a href="#">VA-API hardware support</a> Nvidia: NVENC enabled cards, see <a href="#">nvenc support matrix</a>
CPU	AMD: Ryzen 3 or higher Intel: Core i3 or higher
RAM	4GB or more
OS	Windows: 10+ (Windows Server not supported) macOS: 11.7+ Linux/Debian: 11 (bullseye) Linux/Fedora: 36+ Linux/Ubuntu: 20.04+ (focal)
Network	Host: 5GHz, 802.11ac Client: 5GHz, 802.11ac

### 4k Suggestions

GPU	AMD: Video Coding Engine 3.1 or higher
	Intel: HD Graphics 510 or higher
	Nvidia: GeForce GTX 1080 or higher
CPU	AMD: Ryzen 5 or higher
	Intel: Core i5 or higher
Network	Host: CAT5e ethernet or better
	Client: CAT5e ethernet or better

### **HDR Suggestions**

GPU	AMD: Video Coding Engine 3.4 or higher
	Intel: UHD Graphics 730 or higher
	Nvidia: Pascal-based GPU (GTX 10-series) or higher
CPU	AMD: todo
	Intel: todo
Network	Host: CAT5e ethernet or better
	Client: CAT5e ethernet or better

## **1.3 Integrations**

## **1.4 Support**

Our support methods are listed in our [LizardByte Docs](#).

## **1.5 Downloads**

## **1.6 Stats**



## INSTALLATION

The recommended method for running Sunshine is to use the *binaries* bundled with the *latest release*.

**Attention:** Additional setup is required after installation. See *Setup*.

### 2.1 Binaries

Binaries of Sunshine are created for each release. They are available for Linux, macOS, and Windows. Binaries can be found in the *latest release*.

---

**Tip:** Some third party packages also exist. See *Third Party Packages*.

---

### 2.2 Docker

Docker images are available on [Dockerhub.io](https://hub.docker.com/r/azh33r/sunshine) and [ghcr.io](https://github.com/azh33r/sunshine).

See *Docker* for additional information.

### 2.3 Linux

Follow the instructions for your preferred package type below.

#### CUDA Compatibility

CUDA is used for NVFBC capture.

---

**Tip:** See [CUDA GPUS](#) to cross reference Compute Capability to your GPU.

---

Package	CUDA Version	Min Driver	CUDA Compute Capabilities
PKGBUILD	User dependent	User dependent	User dependent
sunshine.AppImage	11.8.0	450.80.02	50;52;60;61;62;70;75;80;86;90;35
sunshine.pkg.tar.zst	11.8.0	450.80.02	50;52;60;61;62;70;75;80;86;90;35
sunshine_{arch}.flatpak	11.8.0	450.80.02	50;52;60;61;62;70;75;80;86;90;35
sunshine-debian-bullseye-{arch}.deb	11.8.0	450.80.02	50;52;60;61;62;70;75;80;86;90;35
sunshine-fedora-36-{arch}.rpm	12.0.0	525.60.13	50;52;60;61;62;70;75;80;86;90
sunshine-fedora-37-{arch}.rpm	12.0.0	525.60.13	50;52;60;61;62;70;75;80;86;90
sunshine-ubuntu-20.04-{arch}.deb	11.8.0	450.80.02	50;52;60;61;62;70;75;80;86;90;35
sunshine-ubuntu-22.04-{arch}.deb	11.8.0	450.80.02	50;52;60;61;62;70;75;80;86;90;35

### 2.3.1 AppImage

According to AppImageLint the supported distro matrix of the AppImage is below.

- [×] Debian oldstable (buster)
- [✓] Debian stable (bullseye)
- [✓] Debian testing (bookworm)
- [✓] Debian unstable (sid)
- [✓] Ubuntu kinetic
- [✓] Ubuntu jammy
- [✓] Ubuntu focal
- [×] Ubuntu bionic
- [×] Ubuntu xenial
- [×] Ubuntu trusty
- [×] CentOS 7

1. Download `sunshine.AppImage` to your home directory.
2. Open terminal and run the following code.

```
./sunshine.AppImage --install
```

**Start:**

```
./sunshine.AppImage --install && ./sunshine.AppImage
```

**Uninstall:**

```
./sunshine.AppImage --remove
```

### 2.3.2 Archlinux PKGBUILD

1. Open terminal and run the following code.

```
wget https://github.com/LizardByte/Sunshine/releases/latest/download/PKGBUILD
makepkg -fi
```

**Uninstall:**

```
pacman -R sunshine
```

### 2.3.3 Archlinux pkg

1. Open terminal and run the following code.

```
wget https://github.com/LizardByte/Sunshine/releases/latest/download/sunshine.pkg.
↪tar.zst
pacman -U --noconfirm sunshine.pkg.tar.zst
```

**Uninstall:**

```
pacman -R sunshine
```

### 2.3.4 Debian Package

1. Download sunshine-{ubuntu-version}.deb and run the following code.

```
sudo apt install -f ./sunshine-{ubuntu-version}.deb
```

---

**Note:** The {ubuntu-version} is the version of ubuntu we built the package on. If you are not using Ubuntu and have an issue with one package, you can try another.

---

---

**Tip:** You can double click the deb file to see details about the package and begin installation.

---

**Uninstall:**

```
sudo apt remove sunshine
```

### 2.3.5 Flatpak Package

1. Install Flatpak as required.
2. Download sunshine\_{arch}.flatpak and run the following code.

---

**Note:** Be sure to replace {arch} with the architecture for your operating system.

---

**System level (recommended)**

```
flatpak install --system ./sunshine_{arch}.flatpak
```

### User level

```
flatpak install --user ./sunshine_{arch}.flatpak
```

### Additional installation (required)

```
flatpak run --command=additional-install.sh dev.lizardbyte.sunshine
```

### Start:

#### X11 and NVFBC capture (X11 Only)

```
flatpak run dev.lizardbyte.sunshine
```

#### KMS capture (Wayland & X11)

```
sudo -i PULSE_SERVER=unix:${pactl info | awk '/Server String/{print$3}')}  
↪ flatpak run dev.lizardbyte.sunshine
```

### Uninstall:

```
flatpak run --command=remove-additional-install.sh dev.lizardbyte.sunshine  
flatpak uninstall --delete-data dev.lizardbyte.sunshine
```

## 2.3.6 RPM Package

1. Add *rpmfusion* repositories by running the following code.

```
sudo dnf install https://mirrors.rpmfusion.org/free/fedora/rpmfusion-free-release-  
↪ ${rpm -E %fedora}.noarch.rpm \  
https://mirrors.rpmfusion.org/nonfree/fedora/rpmfusion-nonfree-release-${rpm -E  
↪ %fedora}.noarch.rpm
```

2. Download *sunshine.rpm* and run the following code.

```
sudo dnf install ./sunshine.rpm
```

---

**Tip:** You can double click the rpm file to see details about the package and begin installation.

---

### Uninstall:

```
sudo dnf remove sunshine
```

## 2.4 macOS

Sunshine on macOS is experimental. Gamepads do not work. Other features may not work as expected.

### 2.4.1 pkg

**Warning:** The *pkg* does not include runtime dependencies.

1. Download the `sunshine.pkg` file and install it as normal.

**Uninstall:**

```
cd /etc/sunshine/assets
uninstall_pkg.sh
```

### 2.4.2 Portfile

1. Install [MacPorts](#)
2. Update the Macports sources.

```
sudo nano /opt/local/etc/macports/sources.conf
```

**Add this line, replacing your username, below the line that starts with `rsync`.**

```
file:///Users/<username>/ports
```

Ctrl+x, then Y to exit and save changes.

3. Download the Portfile to `~/Downloads` and run the following code.

```
mkdir -p ~/ports/multimedia/sunshine
mv ~/Downloads/Portfile ~/ports/multimedia/sunshine/
cd ~/ports
portindex
sudo port install sunshine
```

4. The first time you start Sunshine, you will be asked to grant access to screen recording and your microphone.

**Uninstall:**

```
sudo port uninstall sunshine
```

## 2.5 Windows

### 2.5.1 Installer

1. Download and install `sunshine-windows-installer.exe`

**Attention:** You should carefully select or unselect the options you want to install. Do not blindly install or enable features.

To uninstall, find Sunshine in the list [here](#) and select “Uninstall” from the overflow menu. Different versions of Windows may provide slightly different steps for uninstall.

### 2.5.2 Standalone

1. Download and extract `sunshine-windows-portable.zip`

To uninstall, delete the extracted directory which contains the `sunshine.exe` file.

## 3.1 Important note

Starting with v0.18.0, tag names have changed. You may no longer use `latest`, `master`, `vX.X.X`.

## 3.2 Build your own containers

This image provides a method for you to easily use the latest Sunshine release in your own docker projects. It is not intended to use as a standalone container at this point, and should be considered experimental.

```
ARG SUNSHINE_VERSION=latest
ARG SUNSHINE_OS=ubuntu-22.04
FROM lizardbyte/sunshine:${SUNSHINE_VERSION}-${SUNSHINE_OS}

# install Steam, Wayland, etc.

ENTRYPOINT steam && sunshine
```

### 3.2.1 SUNSHINE\_VERSION

- `latest`, `master`, `vX.X.X`
- `nightly`
- commit hash

### 3.2.2 SUNSHINE\_OS

Sunshine images are available with the following tag suffixes, based on their respective base images.

- `archlinux`
- `debian-bullseye`
- `fedora-36`
- `fedora-37`
- `ubuntu-20.04`
- `ubuntu-22.04`

### 3.2.3 Tags

You must combine the `SUNSHINE_VERSION` and `SUNSHINE_OS` to determine the tag to pull. The format should be `<SUNSHINE_VERSION>-<SUNSHINE_OS>`. For example, `latest-ubuntu-22.04`.

See all our available tags on [docker hub](#) or [ghcr](#) for more info.

## 3.3 Where used

This is a list of docker projects using Sunshine. Something missing? Let us know about it!

- [Games on Whales](#)

## 3.4 Port and Volume mappings

Examples are below of the required mappings. The configuration file will be saved to `/config` in the container.

### 3.4.1 Using docker run

Create and run the container (substitute your `<values>`):

```
docker run -d \
  --name=<image_name> \
  --restart=unless-stopped
  -e PUID=<uid> \
  -e PGID=<gid> \
  -e TZ=<timezone> \
  -v <path to data>:/config \
  -p 47984-47990:47984-47990/tcp \
  -p 48010:48010 \
  -p 47998-48000:47998-48000/udp \
  <image>
```

### 3.4.2 Using docker-compose

Create a `docker-compose.yml` file with the following contents (substitute your `<values>`):

```
version: '3'
services:
  <image_name>:
    image: <image>
    container_name: sunshine
    restart: unless-stopped
    volumes:
      - <path to data>:/config
    environment:
      - PUID=<uid>
      - PGID=<gid>
      - TZ=<timezone>
```

(continues on next page)



(continued from previous page)

```
ports:
- "47984-47990:47984-47990/tcp"
- "48010:48010"
- "47998-48000:47998-48000/udp"
```

### 3.4.3 Parameters

You must substitute the <values> with your own settings.

Parameters are split into two halves separated by a colon. The left side represents the host and the right side the container.

**Example:** `-p external:internal` - This shows the port mapping from internal to external of the container. Therefore `-p 47990:47990` would expose port 47990 from inside the container to be accessible from the host's IP on port 47990 (e.g. `http://<host_ip>:47990`). The internal port must be 47990, but the external port may be changed (e.g. `-p 8080:47990`). All the ports listed in the `docker run` and `docker-compose` examples are required.

Parameter	Function	Example Value	Required
<code>-p &lt;port&gt;:47990</code>	Web UI Port	47990	True
<code>-v &lt;path to data&gt;:/config</code>	Volume mapping	/home/sunshine	True
<code>-e PUID=&lt;uid&gt;</code>	User ID	1001	False
<code>-e PGID=&lt;gid&gt;</code>	Group ID	1001	False
<code>-e TZ=&lt;timezone&gt;</code>	Lookup TZ value	America/New_York	False

#### User / Group Identifiers:

When using data volumes (-v flags) permissions issues can arise between the host OS and the container. To avoid this issue you can specify the user PUID and group PGID. Ensure the data volume directory on the host is owned by the same user you specify.

In this instance PUID=1001 and PGID=1001. To find yours use `id` user as below:

```
$ id dockeruser
uid=1001(dockeruser) gid=1001(dockergroup) groups=1001(dockergroup)
```

If you want to change the PUID or PGID after the image has been built, it will require rebuilding the image.

## 3.5 Supported Architectures

Specifying `lizardbyte/sunshine:latest-<SUNSHINE_OS>` or `ghcr.io/lizardbyte/sunshine:latest-<SUNSHINE_OS>` should retrieve the correct image for your architecture.

The architectures supported by these images are shown in the table below.

tag suffix	amd64/x86_64	arm64/aarch64
archlinux		
debian-bullseye		
fedora-36		
fedora-37		
ubuntu-20.04		
ubuntu-22.04		

## THIRD PARTY PACKAGES

<b>Danger:</b> These packages are not maintained by LizardByte. Use at your own risk.
---

### 4.1 AUR

### 4.2 Chocolatey

### 4.3 nixpkgs

### 4.4 Scoop

### 4.5 Solus

## 4.6 Winget

## 4.7 Legacy GitHub Repo

**Attention:** This repo is not maintained. Thank you to Loki for bringing this amazing project to life!

## USAGE

1. See the [setup](#) section for your specific OS.
2. If you did not install the service, then start sunshine with the following command, unless a start command is listed in the specified package [installation](#) instructions.

---

**Note:** A service is a process that runs in the background. Running multiple instances of Sunshine is not advised.

---

### Basic usage

```
sunshine
```

### Specify config file

```
sunshine <directory of conf file>/sunshine.conf
```

---

**Note:** You do not need to specify a config file. If no config file is entered the default location will be used.

---

**Attention:** The configuration file specified will be created if it doesn't exist.

3. Configure Sunshine in the web ui

The web ui is available on <https://localhost:47990> by default. You may replace *localhost* with your internal ip address.

**Attention:** Ignore any warning given by your browser about “insecure website”. This is due to the SSL certificate being self signed.

**Caution:** If running for the first time, make sure to note the username and password that you created.

### Add games and applications.

This can be configured in the web ui.

---

**Note:** Additionally, apps can be configured manually. *src\_assets/<os>/config/apps.json* is an example of a list of applications that are started just before running a stream. This is the directory within the GitHub

repo.

---

4. In Moonlight, you may need to add the PC manually.
5. When Moonlight request you insert the correct pin on sunshine:
  - Login to the web ui
  - Go to “PIN” in the Navbar
  - Type in your PIN and press Enter, you should get a Success Message
  - In Moonlight, select one of the Applications listed

## 5.1 Network

The Sunshine user interface will be available on port 47990 by default.

**Warning:** Exposing ports to the internet can be dangerous. Do this at your own risk.

## 5.2 Arguments

To get a list of available arguments run the following:

```
sunshine --help
```

## 5.3 Setup

### 5.3.1 Linux

The *deb*, *rpm*, *Flatpak* and *AppImage* packages handle these steps automatically. Third party packages may not.

Sunshine needs access to *uinput* to create mouse and gamepad events.

1. Add user to group *input*, if this is the first time installing.

```
sudo usermod -a -G input $USER
```

2. Create *udev* rules.

```
echo 'KERNEL=="uinput", GROUP="input", MODE="0660", OPTIONS+="static_node=uinput
→ "' | \
sudo tee /etc/udev/rules.d/85-sunshine-input.rules
```

3. Optionally, configure autostart service
  - filename: `~/.config/systemd/user/sunshine.service`
  - contents:

```
[Unit]
Description=Sunshine self-hosted game stream host for Moonlight.
StartLimitIntervalSec=500
StartLimitBurst=5

[Service]
ExecStart=<see table>
Restart=on-failure
RestartSec=5s
#Flatpak Only
#ExecStop=flatpak kill dev.lizardbyte.sunshine

[Install]
WantedBy=graphical-session.target
```

package	ExecStart	Auto Configured
aur	/usr/bin/sunshine	✓
deb	/usr/bin/sunshine	✓
rpm	/usr/bin/sunshine	✓
AppImage	~/sunshine.AppImage	✓
Flatpak	flatpak run dev.lizardbyte.sunshine	✓

**Start once**

```
systemctl --user start sunshine
```

**Start on boot**

```
systemctl --user enable sunshine
```

**4. Additional Setup for KMS**

**Note:** cap\_sys\_admin may as well be root, except you don't need to be root to run it. It is necessary to allow Sunshine to use KMS.

**Enable**

```
sudo setcap cap_sys_admin+p $(readlink -f $(which sunshine))
```

**Disable (for Xorg/X11)**

```
sudo setcap -r $(readlink -f $(which sunshine))
```

**5. Reboot**

```
sudo reboot now
```

### 5.3.2 macOS

Sunshine can only access microphones on macOS due to system limitations. To stream system audio use [Soundflower](#) or [BlackHole](#).

---

**Note:** Command Keys are not forwarded by Moonlight. Right Option-Key is mapped to CMD-Key.

---

**Caution:** Gamepads are not currently supported.

#### Configure autostart service

##### MacPorts

```
sudo port load Sunshine
```

### 5.3.3 Windows

For gamepad support, install [ViGEmBus](#)

#### Sunshine firewall

##### Add rule

```
cd /d "C:\Program Files\Sunshine\scripts"  
add-firewall-rule.bat
```

##### Remove rule

```
cd /d "C:\Program Files\Sunshine\scripts"  
remove-firewall-rule.bat
```

#### Sunshine service

##### Enable

```
cd /d "C:\Program Files\Sunshine\scripts"  
install-service.bat
```

##### Disable

```
cd /d "C:\Program Files\Sunshine\scripts"  
uninstall-service.bat
```



## 5.4 Shortcuts

All shortcuts start with CTRL + ALT + SHIFT, just like Moonlight

- CTRL + ALT + SHIFT + N - Hide/Unhide the cursor (This may be useful for Remote Desktop Mode for Moonlight)
- CTRL + ALT + SHIFT + F1/F12 - Switch to different monitor for Streaming

## 5.5 Application List

- Applications should be configured via the web UI.
- A basic understanding of working directories and commands is required.
- You can use Environment variables in place of values
- \$(HOME) will be replaced by the value of \$HOME
- \$\$ will be replaced by \$, e.g. \$\$ (HOME) will become \$(HOME)
- env - Adds or overwrites Environment variables for the commands/applications run by Sunshine
- "Variable name": "Variable value"
- apps - The list of applications
- Advanced users may want to edit the application list manually. The format is json.
- **Example application:**

```
{
  "cmd": "command to open app",
  "detached": [
    "some-command",
    "another-command"
  ],
  "image-path": "/full-path/to/png-image",
  "name": "An App",
  "output": "/full-path/to/command-log-file",
  "prep-cmd": [
    {
      "do": "some-command",
      "undo": "undo-that-command"
    }
  ],
  "working-dir": "/full-path/to/working-directory"
}
```

- cmd - The main application
- detached - A list of commands to be run and forgotten about
  - \* If not specified, a process is started that sleeps indefinitely
- image-path - The full path to the cover art image to use.
- name - The name of the application/game
- output - The file where the output of the command is stored

- `prep-cmd` - A list of commands to be run before/after the application
  - \* If any of the prep-commands fail, starting the application is aborted
  - \* `do` - Run before the application
    - If it fails, all `undo` commands of the previously succeeded `do` commands are run
  - \* `undo` - Run after the application has terminated
    - Failures of `undo` commands are ignored
- `working-dir` - The working directory to use. If not specified, Sunshine will use the application directory.

## 5.6 Considerations

- When an application is started, if there is an application already running, it will be terminated.
- When the application has been shutdown, the stream shuts down as well.
  - For example, if you attempt to run `steam` as a `cmd` instead of `detached` the stream will immediately fail. This is due to the method in which the steam process is executed. Other applications may behave similarly.
- In addition to the apps listed, one app “Desktop” is hardcoded into Sunshine. It does not start an application, instead it simply starts a stream.
- For the Linux flatpak you must prepend commands with `flatpak-spawn --host`.

## 5.7 HDR Support

Streaming HDR content is supported for Windows hosts with NVIDIA, AMD, or Intel GPUs that support encoding HEVC Main 10. You must have an HDR-capable display or EDID emulator dongle connected to your host PC to activate HDR in Windows.

- Ensure you enable the HDR option in your Moonlight client settings, otherwise the stream will be SDR.
- A good HDR experience relies on proper HDR display calibration both in Windows and in game. HDR calibration can differ significantly between client and host displays.
- We recommend calibrating the display by streaming the Windows HDR Calibration app to your client device and saving an HDR calibration profile to use while streaming.
- You may also need to tune the brightness slider or HDR calibration options in game to the different HDR brightness capabilities of your client’s display.
- Older games that use NVIDIA-specific NVAPI HDR rather than native Windows 10 OS HDR support may not display in HDR.
- Some GPUs can produce lower image quality or encoding performance when streaming in HDR compared to SDR.

## 5.8 Tutorials

Tutorial videos are available [here](#).

---

### Community!

Tutorials are community generated. Want to contribute? Reach out to us on our discord server.

---



## ADVANCED USAGE

Sunshine will work with the default settings for most users. In some cases you may want to configure Sunshine further.

### 6.1 Performance Tips

#### 6.1.1 AMD

In Windows, enabling *Enhanced Sync* in AMD's settings may help reduce the latency by an additional frame. This applies to *amfenc* and *libx264*.

#### 6.1.2 Nvidia

Enabling *Fast Sync* in Nvidia settings may help reduce latency.

### 6.2 Configuration

The default location for the configuration file is listed below. You can use another location if you choose, by passing in the full configuration file path as the first argument when you start Sunshine.

The default location of the `apps.json` is the same as the configuration file. You can use a custom location by modifying the configuration file.

#### Default File Location

Value	Description
Docker	/config/
Linux	~/.config/sunshine/
macOS	~/.config/sunshine/
Windows	%ProgramFiles%\Sunshine\config

#### Example

```
sunshine ~/sunshine_config.conf
```

To manually configure sunshine you may edit the `conf` file in a text editor. Use the examples as reference.

---

**Hint:** Some settings are not available within the web ui.

---

## 6.3 General

### 6.3.1 sunshine\_name

**Description**

The name displayed by Moonlight

**Default**

PC hostname

**Example**

```
sunshine_name = Sunshine
```

### 6.3.2 min\_log\_level

**Description**

The minimum log level printed to standard out.

**Choices**

Value	Description
verbose	verbose logging
debug	debug logging
info	info logging
warning	warning logging
error	error logging
fatal	fatal logging
none	no logging

**Default**

info

**Example**

```
min_log_level = info
```

### 6.3.3 log\_path

**Description**

The path where the sunshine log is stored.

**Default**

sunshine.log

**Example**

```
log_path = sunshine.log
```

## 6.4 Controls

### 6.4.1 gamepad

#### Description

The type of gamepad to emulate on the host.

**Caution:** Applies to Windows only.

#### Choices

Value	Description
x360	xbox 360 controller
ds4	dualshock controller (PS4)

#### Default

x360

#### Example

```
gamepad = x360
```

### 6.4.2 back\_button\_timeout

#### Description

If, after the timeout, the back/select button is still pressed down, Home/Guide button press is emulated.

On Nvidia Shield, the home and power button are not passed to Moonlight.

**Tip:** If `back_button_timeout < 0`, then the Home/Guide button will not be emulated.

#### Default

2000

#### Example

```
back_button_timeout = 2000
```

### 6.4.3 key\_repeat\_delay

#### Description

The initial delay in milliseconds before repeating keys. Controls how fast keys will repeat themselves.

#### Default

500

#### Example

```
key_repeat_delay = 500
```

### 6.4.4 key\_repeat\_frequency

#### Description

How often keys repeat every second.

---

**Tip:** This configurable option supports decimals.

---

#### Default

---

**Todo:** Unknown

---

#### Example

```
key_repeat_frequency = 24.9
```

### 6.4.5 keybindings

#### Description

Sometimes it may be useful to map keybindings. Wayland won't allow clients to capture the Win Key for example.

---

**Tip:** See [virtual key codes](#)

---

---

**Hint:** keybindings needs to have a multiple of two elements.

---

#### Default

None

#### Example

```
keybindings = [  
    0x10, 0xA0,  
    0x11, 0xA2,  
    0x12, 0xA4,  
    0x4A, 0x4B  
]
```



## 6.4.6 key\_rightalt\_to\_key\_win

### Description

It may be possible that you cannot send the Windows Key from Moonlight directly. In those cases it may be useful to make Sunshine think the Right Alt key is the Windows key.

### Default

None

### Example

```
key_rightalt_to_key_win = enabled
```

## 6.5 Display

### 6.5.1 adapter\_name

#### Description

Select the video card you want to stream.

---

**Tip:** To find the name of the appropriate values follow these instructions.

#### Linux + VA-API

Unlike with *amdvce* and *nvenc*, it doesn't matter if video encoding is done on a different GPU.

```
ls /dev/dri/renderD* # to find all devices capable of VAAPI

# replace ``renderD129`` with the device from above to lists the name and
↳ capabilities of the device
vainfo --display drm --device /dev/dri/renderD129 | \
  grep -E "((VAProfileH264High|VAProfileHEVCMain|VAProfileHEVCMain10).
↳ *VAEntrypointEncSlice)|Driver version"
```

To be supported by Sunshine, it needs to have at the very minimum: VAProfileH264High : VAEntrypointEncSlice

---

**Todo:** macOS

---

#### Windows

```
tools\dxgi-info.exe
```

---

#### Default

Sunshine will select the default video card.

#### Examples

##### Linux

```
adapter_name = /dev/dri/renderD128
```

## Sunshine

---

---

**Todo:** macOS

---

### Windows

```
adapter_name = Radeon RX 580 Series
```

## 6.5.2 output\_name

### Description

Select the display number you want to stream.

---

**Tip:** To find the name of the appropriate values follow these instructions.

### Linux

```
xrandr --listmonitors
```

Example output: 0: +HDMI-1 1920/518x1200/324+0+0 HDMI-1

You need to use the value before the colon in the output, e.g. 0.

---

**Todo:** macOS

---

### Windows

```
tools\dxgi-info.exe
```

### Default

Sunshine will select the default display.

### Examples

#### Linux

```
output_name = 0
```

---

**Todo:** macOS

---

### Windows

```
output_name = \\.\\DISPLAY1
```

### 6.5.3 fps

#### Description

The fps modes advertised by Sunshine.

---

**Note:** Some versions of Moonlight, such as Moonlight-nx (Switch), rely on this list to ensure that the requested fps is supported.

---

#### Default

---

**Todo:** Unknown

---

#### Example

```
fps = [10, 30, 60, 90, 120]
```

### 6.5.4 resolutions

#### Description

The resolutions advertised by Sunshine.

---

**Note:** Some versions of Moonlight, such as Moonlight-nx (Switch), rely on this list to ensure that the requested resolution is supported.

---

#### Default

---

**Todo:** Unknown

---

#### Example

```
resolutions = [  
    352x240,  
    480x360,  
    858x480,  
    1280x720,  
    1920x1080,  
    2560x1080,  
    3440x1440,  
    1920x1200,  
    3860x2160,  
    3840x1600,  
]
```

## 6.5.5 dwmflush

### Description

Invoke `DwmFlush()` to sync screen capture to the Windows presentation interval.

**Caution:** Applies to Windows only. Alleviates visual stuttering during mouse movement. If enabled, this feature will automatically deactivate if the client framerate exceeds the host monitor's current refresh rate.

---

**Note:** If you disable this option, you may see video stuttering during mouse movement in certain scenarios. It is recommended to leave enabled when possible.

---

### Default

enabled

### Example

```
dwmflush = enabled
```

## 6.6 Audio

### 6.6.1 audio\_sink

#### Description

The name of the audio sink used for audio loopback.

---

**Tip:** To find the name of the audio sink follow these instructions.

#### Linux + pulseaudio

```
pacmd list-sinks | grep "name:"
```

#### Linux + pipewire

```
pactl info | grep Source
# in some causes you'd need to use the `Sink` device, if `Source` doesn't work, so
↳ try:
pactl info | grep Sink
```

#### macOS

Sunshine can only access microphones on macOS due to system limitations. To stream system audio use [Soundflower](#) or [BlackHole](#).

#### Windows

```
tools\audio-info.exe
```

---

### Default

Sunshine will select the default audio device.

## Examples

### Linux

```
audio_sink = alsa_output.pci-0000_09_00.3.analog-stereo
```

### macOS

```
audio_sink = BlackHole 2ch
```

### Windows

```
audio_sink = {0.0.0.000000000}. {FD47D9CC-4218-4135-9CE2-0C195C87405B}
```

## 6.6.2 virtual\_sink

### Description

The audio device that's virtual, like Steam Streaming Speakers. This allows Sunshine to stream audio, while muting the speakers.

---

**Tip:** See [audio\\_sink](#)!

---

### Default

---

**Todo:** Unknown

---

### Example

```
virtual_sink = {0.0.0.000000000}. {8edba70c-1125-467c-b89c-15da389bc1d4}
```

## 6.7 Network

### 6.7.1 external\_ip

#### Description

If no external IP address is given, Sunshine will attempt to automatically detect external ip-address.

#### Default

Automatic

#### Example

```
external_ip = 123.456.789.12
```

## 6.7.2 port

### Description

Set the family of ports used by Sunshine. Changing this value will offset other ports per the table below.

Port Description	Default Port	Difference from config port
HTTPS	47984 TCP	-5
HTTP	47989 TCP	0
Web	47990 TCP	+1
RTSP	48010 TCP	+21
Video	47998 UDP	+9
Control	47999 UDP	+10
Audio	48000 UDP	+11
Mic (unused)	48002 UDP	+13

**Attention:** Custom ports are only allowed on select Moonlight clients.

### Default

47989

### Example

```
port = 47989
```

## 6.7.3 pkey

### Description

The private key. This must be 2048 bits.

### Default

---

**Todo:** Unknown

---

### Example

```
pkey = /dir/pkey.pem
```

## 6.7.4 cert

### Description

The certificate. Must be signed with a 2048 bit key.

### Default

---

**Todo:** Unknown

---

### Example

```
cert = /dir/cert.pem
```

### 6.7.5 origin\_pin\_allowed

#### Description

The origin of the remote endpoint address that is not denied for HTTP method /pin.

#### Choices

Value	Description
pc	Only localhost may access /pin
lan	Only LAN devices may access /pin
wan	Anyone may access /pin

#### Default

pc

#### Example

```
origin_pin_allowed = pc
```

### 6.7.6 origin\_web\_ui\_allowed

#### Description

The origin of the remote endpoint address that is not denied for HTTPS Web UI.

#### Choices

Value	Description
pc	Only localhost may access the web ui
lan	Only LAN devices may access the web ui
wan	Anyone may access the web ui

#### Default

lan

#### Example

```
origin_web_ui_allowed = lan
```

### 6.7.7 upnp

#### Description

Sunshine will attempt to open ports for streaming over the internet.

#### Choices

Value	Description
on	enable UPnP
off	disable UPnP

**Default**

off

**Example**

```
upnp = on
```

## 6.7.8 ping\_timeout

**Description**

How long to wait in milliseconds for data from Moonlight before shutting down the stream.

**Default**

10000

**Example**

```
ping_timeout = 10000
```

## 6.8 Encoding

### 6.8.1 channels

**Description**

This will generate distinct video streams, unlike simply broadcasting to multiple Clients.

When multicasting, it could be useful to have different configurations for each connected Client.

For instance:

- Clients connected through WAN and LAN have different bitrate constraints.
- Decoders may require different settings for color.

**Warning:** CPU usage increases for each distinct video stream generated.

**Default**

1

**Example**

```
channels = 1
```



## 6.8.2 fec\_percentage

### Description

Percentage of error correcting packets per data packet in each video frame.

**Warning:** Higher values can correct for more network packet loss, but at the cost of increasing bandwidth usage.

### Default

20

### Range

1-255

### Example

```
fec_percentage = 20
```

## 6.8.3 qp

### Description

Quantization Parameter. Some devices don't support Constant Bit Rate. For those devices, QP is used instead.

**Warning:** Higher value means more compression, but less quality.

### Default

28

### Example

```
qp = 28
```

## 6.8.4 min\_threads

### Description

Minimum number of threads used for software encoding.

**Note:** Increasing the value slightly reduces encoding efficiency, but the tradeoff is usually worth it to gain the use of more CPU cores for encoding. The ideal value is the lowest value that can reliably encode at your desired streaming settings on your hardware.

### Default

1

### Example

```
min_threads = 1
```

### 6.8.5 hevc\_mode

**Description**

Allows the client to request HEVC Main or HEVC Main10 video streams.

**Warning:** HEVC is more CPU-intensive to encode, so enabling this may reduce performance when using software encoding.

**Choices**

Value	Description
0	advertise support for HEVC based on encoder
1	do not advertise support for HEVC
2	advertise support for HEVC Main profile
3	advertise support for HEVC Main and Main10 (HDR) profiles

**Default**

0

**Example**

```
hevc_mode = 2
```

### 6.8.6 encoder

**Description**

Force a specific encoder.

**Choices**

Value	Description
nvenc	For NVIDIA graphics cards
quicksync	For Intel graphics cards
amdvc	For AMD graphics cards
software	Encoding occurs on the CPU

**Default**

Sunshine will use the first encoder that is available.

**Example**

```
encoder = nvenc
```

### 6.8.7 sw\_preset

#### Description

The encoder preset to use.

---

**Note:** This option only applies when using software *encoder*.

---



---

**Note:** From [FFmpeg](#).

A preset is a collection of options that will provide a certain encoding speed to compression ratio. A slower preset will provide better compression (compression is quality per filesize). This means that, for example, if you target a certain file size or constant bit rate, you will achieve better quality with a slower preset. Similarly, for constant quality encoding, you will simply save bitrate by choosing a slower preset.

Use the slowest preset that you have patience for.

---

#### Choices

Value	Description
ultrafast	fastest
superfast	
veryfast	
superfast	
faster	
fast	
medium	
slow	
slow	
slower	
veryslow	slowest

#### Default

superfast

#### Example

```
sw_preset = superfast
```

### 6.8.8 sw\_tune

#### Description

The tuning preset to use.

---

**Note:** This option only applies when using software *encoder*.

---



---

**Note:** From [FFmpeg](#).

You can optionally use `-tune` to change settings based upon the specifics of your input.

---

**Choices**

Value	Description
film	use for high quality movie content; lowers deblocking
animation	good for cartoons; uses higher deblocking and more reference frames
grain	preserves the grain structure in old, grainy film material
stillimage	good for slideshow-like content
fastdecode	allows faster decoding by disabling certain filters
zerolatency	good for fast encoding and low-latency streaming

**Default**

zerolatency

**Example**

```
sw_tune    = zerolatency
```

## 6.8.9 nv\_preset

**Description**

The encoder preset to use.

---

**Note:** This option only applies when using nvenc *encoder*. For more information on the presets, see [nvenc preset migration guide](#).

---

**Choices**

Value	Description
p1	fastest (lowest quality)
p2	faster (lower quality)
p3	fast (low quality)
p4	medium (default)
p5	slow (good quality)
p6	slower (better quality)
p7	slowest (best quality)

**Default**

p4

**Example**

```
nv_preset = p4
```

### 6.8.10 nv\_tune

**Description**

The encoder tuning profile.

---

**Note:** This option only applies when using nvenc *encoder*.

---

**Choices**

Value	Description
hq	high quality
ll	low latency
ull	ultra low latency
lossless	lossless

**Default**

ull

**Example**

```
nv_tune = ull
```

### 6.8.11 nv\_rc

**Description**

The encoder rate control.

---

**Note:** This option only applies when using nvenc *encoder*.

---

**Choices**

Value	Description
constqp	constant QP mode
vbr	variable bitrate
cbr	constant bitrate

**Default**

cbr

**Example**

```
nv_rc = cbr
```

### 6.8.12 nv\_coder

**Description**

The entropy encoding to use.

---

**Note:** This option only applies when using H264 with nvenc *encoder*.

---

**Choices**

Value	Description
auto	let ffmpeg decide
cabac	context adaptive binary arithmetic coding - higher quality
cavlc	context adaptive variable-length coding - faster decode

**Default**

auto

**Example**

```
nv_coder = auto
```

### 6.8.13 qsv\_preset

**Description**

The encoder preset to use.

---

**Note:** This option only applies when using quicksync *encoder*.

---

**Choices**

Value	Description
veryfast	fastest (lowest quality)
faster	faster (lower quality)
fast	fast (low quality)
medium	medium (default)
slow	slow (good quality)
slower	slower (better quality)
veryslow	slowest (best quality)

**Default**

medium

**Example**

```
qsv_preset = medium
```

### 6.8.14 qsv\_coder

#### Description

The entropy encoding to use.

---

**Note:** This option only applies when using H264 with quicksync *encoder*.

---

#### Choices

Value	Description
auto	let ffmpeg decide
cabac	context adaptive binary arithmetic coding - higher quality
cavlc	context adaptive variable-length coding - faster decode

#### Default

auto

#### Example

```
qsv_coder = auto
```

### 6.8.15 amd\_quality

#### Description

The encoder preset to use.

---

**Note:** This option only applies when using amdvc *encoder*.

---

#### Choices

Value	Description
speed	prefer speed
balanced	balanced
quality	prefer quality

#### Default

balanced

#### Example

```
amd_quality = balanced
```

### 6.8.16 amd\_rc

**Description**

The encoder rate control.

---

**Note:** This option only applies when using amdvc *encoder*.

---

**Choices**

Value	Description
cqp	constant qp mode
cbr	constant bitrate
vbr_latency	variable bitrate, latency constrained
vbr_peak	variable bitrate, peak constrained

**Default**

vbr\_latency

**Example**

```
amd_rc = vbr_latency
```

### 6.8.17 amd\_usage

**Description**

The encoder usage profile, used to balance latency with encoding quality.

---

**Note:** This option only applies when using amdvc *encoder*.

---

**Choices**

Value	Description
transcoding	transcoding (slowest)
webcam	webcam (slow)
lowlatency	low latency (fast)
ultralowlatency	ultra low latency (fastest)

**Default**

ultralowlatency

**Example**

```
amd_usage = ultralowlatency
```



### 6.8.18 amd\_preanalysis

#### Description

Preanalysis can increase encoding quality at the cost of latency.

---

**Note:** This option only applies when using amdvc *encoder*.

---

#### Default

disabled

#### Example

```
amd_preanalysis = disabled
```

### 6.8.19 amd\_vbaq

#### Description

Variance Based Adaptive Quantization (VBAQ) can increase subjective visual quality.

---

**Note:** This option only applies when using amdvc *encoder*.

---

#### Default

enabled

#### Example

```
amd_vbaq = enabled
```

### 6.8.20 amd\_coder

#### Description

The entropy encoding to use.

---

**Note:** This option only applies when using H264 with amdvc *encoder*.

---

#### Choices

Value	Description
auto	let ffmpeg decide
cabac	context adaptive variable-length coding - higher quality
cavlc	context adaptive binary arithmetic coding - faster decode

#### Default

auto

#### Example

```
amd_coder = auto
```

### 6.8.21 vt\_software

**Description**

Force Video Toolbox to use software encoding.

---

**Note:** This option only applies when using macOS.

---

**Choices**

Value	Description
auto	let ffmpeg decide
disabled	disable software encoding
allowed	allow software encoding
forced	force software encoding

**Default**

auto

**Example**

```
vt_software = auto
```

### 6.8.22 vt\_realtime

**Description**

Realtime encoding.

---

**Note:** This option only applies when using macOS.

---

**Warning:** Disabling realtime encoding might result in a delayed frame encoding or frame drop.

**Default**

enabled

**Example**

```
vt_realtime = enabled
```

### 6.8.23 vt\_coder

**Description**

The entropy encoding to use.

---

**Note:** This option only applies when using macOS.

---

**Choices**

Value	Description
auto	let ffmpeg decide
cabac	
cavlc	

**Default**

auto

**Example**

```
vt_coder = auto
```

## 6.9 Advanced

### 6.9.1 file\_apps

**Description**

The application configuration file path. The file contains a json formatted list of applications that can be started by Moonlight.

**Default**

OS and package dependent

**Example**

```
file_apps = apps.json
```

### 6.9.2 file\_state

**Description**

The file where current state of Sunshine is stored.

**Default**

sunshine\_state.json

**Example**

```
file_state = sunshine_state.json
```

### 6.9.3 credentials\_file

**Description**

The file where user credentials for the UI are stored.

**Default**

sunshine\_state.json

**Example**

```
credentials_file = sunshine_state.json
```

## GAMESTREAM

Nvidia announced that their GameStream service for Nvidia Games clients will be discontinued in February 2023. Luckily, Sunshine performance is now on par with Nvidia GameStream. Many users have even reported that Sunshine outperforms GameStream, so rest assured that Sunshine will be equally performant moving forward.

### 7.1 Migration

We have developed a simple migration tool to help you migrate your GameStream games and apps to Sunshine automatically. Please check out our [GSMS](#) project if you're interested in an automated migration option. At the time of writing this GSMS offers the ability to migrate your custom games and apps. The working directory, command, and image are all set in Sunshine's `apps.json` file. The box-art image is also copied to a specified directory.

### 7.2 Limitations

Sunshine does have some limitations, as compared to Nvidia GameStream.

- Automatic game/application list.
- Changing game settings automatically, to optimize streaming.



## GENERAL

## 8.1 Forgotten Credentials

If you forgot your credentials to the web UI, try this.

```
sunshine --creds <new username> <new password>
```

## 8.2 Web UI Access

Can't access the web UI?

1. Check firewall rules.

## 8.3 Nvidia issues

NvFBC, NvENC, or general issues with Nvidia graphics card.

- Consumer grade Nvidia cards are software limited to a specific number of encodes. See [Video Encode and Decode GPU Support Matrix](#) for more info.
- You can usually bypass the restriction with a driver patch. See Keylase's [Linux](#) or [Windows](#) patches for more guidance.





## 9.1 KMS Streaming fails

If screencasting fails with KMS, you may need to run the following to force unprivileged screencasting.

```
sudo setcap -r $(readlink -f $(which sunshine))
```



## 10.1 Dynamic session lookup failed

If you get this error:

*Dynamic session lookup supported but failed: launchd did not provide a socket path, verify that org.freedesktop.dbus-session.plist is loaded!*

Try this.

```
launchctl load -w /Library/LaunchAgents/org.freedesktop.dbus-session.plist
```



## WINDOWS

### 11.1 No gamepad detected

1. Verify that you've installed [ViGEmBus](#).



## BUILD

Sunshine binaries are built using [CMake](#). Cross compilation is not supported. That means the binaries must be built on the target operating system and architecture.

## 12.1 Building Locally

### 12.1.1 Clone

Ensure [git](#) is installed and run the following:

```
git clone https://github.com/lizardbyte/sunshine.git --recurse-submodules
cd sunshine && mkdir build && cd build
```

### 12.1.2 Compile

See the section specific to your OS.

- *Linux*
- *macOS*
- *Windows*

## 12.2 Remote Build

It may be beneficial to build remotely in some cases. This will enable easier building on different operating systems.

1. Fork the project
2. Activate workflows
3. Trigger the *CI* workflow manually
4. Download the artifacts/binaries from the workflow run summary





## 13.1 Requirements

### 13.1.1 Debian Bullseye

End of Life: TBD

#### Install Requirements

```
sudo apt update && sudo apt install \  
    build-essential \  
    cmake \  
    libavdevice-dev \  
    libboost-filesystem-dev \  
    libboost-log-dev \  
    libboost-program-options-dev \  
    libboost-thread-dev \  
    libcap-dev \ # KMS  
    libcurl4-openssl-dev \  
    libdrm-dev \ # KMS  
    libevdev-dev \  
    libmfx-dev \ # x86_64 only  
    libnuma-dev \  
    libopus-dev \  
    libpulse-dev \  
    libssl-dev \  
    libva-dev \  
    libvdpau-dev \  
    libwayland-dev \ # Wayland  
    libx11-dev \ # X11  
    libxcb-shm0-dev \ # X11  
    libxcb-xfixes0-dev \ # X11  
    libxcb1-dev \ # X11  
    libxfixes-dev \ # X11  
    libxrandr-dev \ # X11  
    libxtst-dev \ # X11  
    nodejs \  
    npm \  
    nvidia-cuda-dev \ # Cuda, NvFBC  
    nvidia-cuda-toolkit \ # Cuda, NvFBC
```

### 13.1.2 Fedora 36, 37

End of Life: TBD

#### Install Requirements

```
sudo dnf update && \
sudo dnf group install "Development Tools" && \
sudo dnf install \
    boost-devel \
    cmake \
    gcc \
    gcc-c++ \
    intel-mediasdk-devel \ # x86_64 only
    libcap-devel \
    libcurl-devel \
    libdrm-devel \
    libevdev-devel \
    libva-devel \
    libvdpau-devel \
    libX11-devel \ # X11
    libxcb-devel \ # X11
    libXcursor-devel \ # X11
    libXfixes-devel \ # X11
    libXi-devel \ # X11
    libXinerama-devel \ # X11
    libXrandr-devel \ # X11
    libXtst-devel \ # X11
    mesa-libGL-devel \
    npm \
    numactl-devel \
    openssl-devel \
    opus-devel \
    pulseaudio-libs-devel \
    rpm-build \ # if you want to build an RPM binary package
    wget \ # necessary for cuda install with `run` file
    which \ # necessary for cuda install with `run` file
```

### 13.1.3 Ubuntu 20.04

End of Life: April 2030

#### Install Requirements

```
sudo apt update && sudo apt install \
    build-essential \
    cmake \
    g++-10 \
    libavdevice-dev \
    libboost-filesystem-dev \
    libboost-log-dev \
    libboost-thread-dev \
    libboost-program-options-dev \
```

(continues on next page)

(continued from previous page)

```

libcap-dev \ # KMS
libdrm-dev \ # KMS
libevdev-dev \
libmfx-dev \ # x86_64 only
libnuma-dev \
libopus-dev \
libpulse-dev \
libssl-dev \
libva-dev \
libvdpau-dev \
libwayland-dev \ # Wayland
libx11-dev \ # X11
libxcb-shm0-dev \ # X11
libxcb-xfixes0-dev \ # X11
libxcb1-dev \ # X11
libxfixes-dev \ # X11
libxrandr-dev \ # X11
libxtst-dev \ # X11
nodejs \
npm \
wget # necessary for cuda install with `run` file

```

### Update gcc alias

```

update-alternatives --install \
/usr/bin/gcc gcc /usr/bin/gcc-10 100 \
--slave /usr/bin/g++ g++ /usr/bin/g++-10 \
--slave /usr/bin/gcov gcov /usr/bin/gcov-10 \
--slave /usr/bin/gcc-ar gcc-ar /usr/bin/gcc-ar-10 \
--slave /usr/bin/gcc-ranlib gcc-ranlib /usr/bin/gcc-ranlib-10

```

## 13.1.4 Ubuntu 22.04

End of Life: April 2027

### Install Requirements

```

sudo apt update && sudo apt install \
build-essential \
cmake \
libavdevice-dev \
libboost-filesystem-dev \
libboost-log-dev \
libboost-thread-dev \
libboost-program-options-dev \
libcap-dev \ # KMS
libdrm-dev \ # KMS
libevdev-dev \
libmfx-dev \ # x86_64 only
libnuma-dev \
libopus-dev \

```

(continues on next page)

(continued from previous page)

```
libpulse-dev \  
libssl-dev \  
libwayland-dev \ # Wayland  
libx11-dev \ # X11  
libxcb-shm0-dev \ # X11  
libxcb-xf86-drm-0-dev \ # X11  
libxcb1-dev \ # X11  
libxfixes-dev \ # X11  
libxrandr-dev \ # X11  
libxtst-dev \ # X11  
nodejs \  
npm \  
nvidia-cuda-dev \ # CUDA, NvFBC  
nvidia-cuda-toolkit # CUDA, NvFBC
```

## 13.2 CUDA

If the version of CUDA available from your distro is not adequate, manually install CUDA.

---

**Tip:** The version of CUDA you use will determine compatibility with various GPU generations. See [CUDA compatibility](#) for more info.

Select the appropriate run file based on your desired CUDA version and architecture according to [CUDA Toolkit Archive](#).

---

```
wget https://developer.download.nvidia.com/compute/cuda/11.4.2/local_installers/cuda_11.  
↪4.2_470.57.02_linux.run \  
--progress=bar:force:noscroll -q --show-progress -O ./cuda.run  
chmod a+x ./cuda.run  
./cuda.run --silent --toolkit --toolkitpath=/usr --no-opengl-libs --no-man-page --no-drm  
rm ./cuda.run
```

## 13.3 npm dependencies

Install npm dependencies.

```
npm install
```

## 13.4 Build

**Attention:** Ensure you are in the build directory created during the clone step earlier before continuing.

```
cmake ..  
make -j ${nproc}  
  
cpack -G DEB # optionally, create a deb package  
cpack -G RPM # optionally, create a rpm package
```



## 14.1 Requirements

macOS Big Sur and Xcode 12.5+

Use either [MacPorts](#) or [Homebrew](#)

### 14.1.1 MacPorts

#### Install Requirements

```
sudo port install avahi boost180 cmake curl libopus npm9 pkgconfig
```

### 14.1.2 Homebrew

#### Install Requirements

```
brew install boost cmake node opus  
# if there are issues with an SSL header that is not found:  
cd /usr/local/include  
ln -s ../opt/openssl/include/openssl .
```

## 14.2 npm dependencies

#### Install npm dependencies.

```
npm install
```

## 14.3 Build

**Attention:** Ensure you are in the build directory created during the clone step earlier before continuing.

```
cmake ..  
make -j ${nproc}  
  
cpack -G DragNDrop # optionally, create a macOS dmg package
```

**If cmake fails complaining to find Boost, try to set the path explicitly.**

```
cmake -DBOOST_ROOT=[boost path] .., e.g., cmake -DBOOST_ROOT=/opt/local/libexec/boost/1.  
80 ..
```



## 15.1 Requirements

First you need to install [MSYS2](#), then startup “MSYS2 MinGW 64-bit” and execute the following codes.

**Update all packages:**

```
pacman -Suy
```

**Install dependencies:**

```
pacman -S base-devel cmake diffutils gcc git make mingw-w64-x86_64-binutils \  
mingw-w64-x86_64-boost mingw-w64-x86_64-cmake mingw-w64-x86_64-curl \  
mingw-w64-x86_64-libmfx mingw-w64-x86_64-openssl mingw-w64-x86_64-opus \  
mingw-w64-x86_64-toolchain
```

## 15.2 npm dependencies

Install nodejs and npm. Downloads available [here](#).

**Install npm dependencies.**

```
npm install
```

## 15.3 Build

**Attention:** Ensure you are in the build directory created during the clone step earlier before continuing.

```
cmake -G "MinGW Makefiles" ..  
mingw32-make -j$(nproc)  
  
cpack -G NSIS # optionally, create a windows installer  
cpack -G ZIP # optionally, create a windows standalone package
```



## CONTRIBUTING

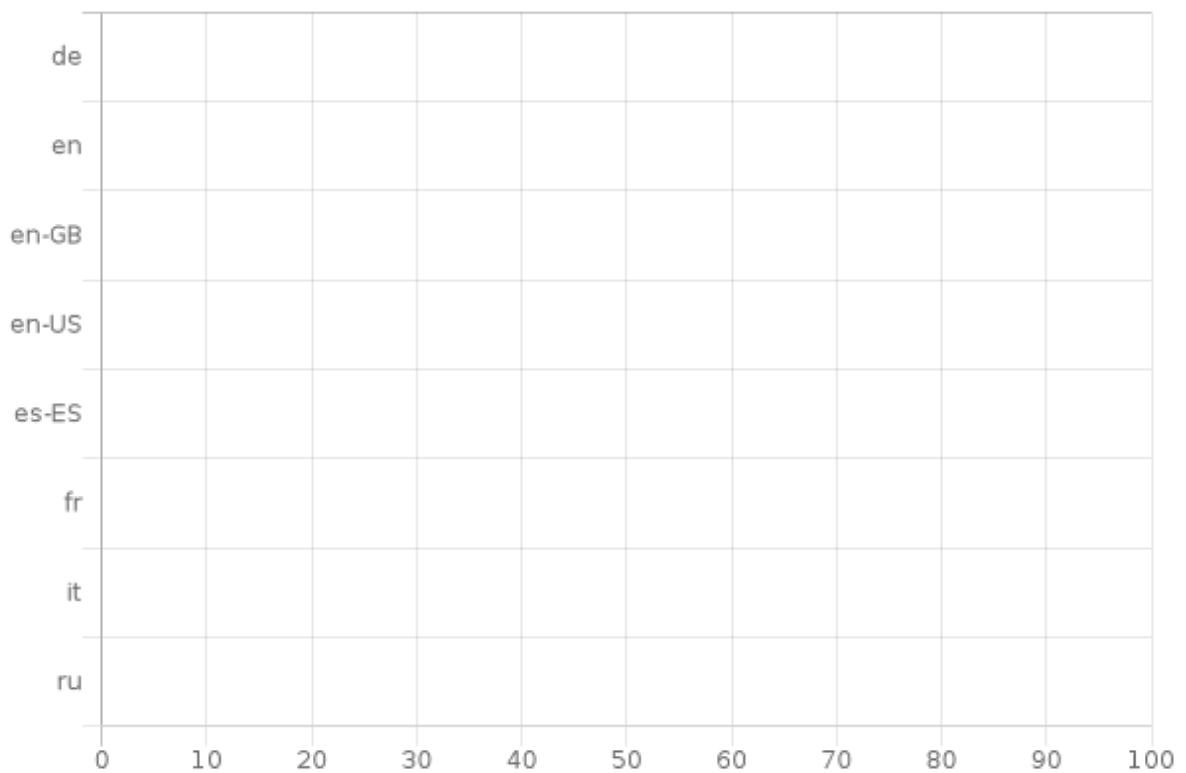
Read our contribution guide in our organization level [docs](#).



## LOCALIZATION

Sunshine is being localized into various languages. The default language is *en* (English) and is highlighted green.

Graph



## 17.1 CrowdIn

The translations occur on [CrowdIn](#). Feel free to contribute to localization there. Only elements of the API are planned to be translated.

**Attention:** The rest API has not yet been implemented.

### Translations Basics

- The brand names *LizardByte* and *Sunshine* should never be translated.
- Other brand names should never be translated. Examples:
  - AMD
  - Nvidia

### CrowdIn Integration

How does it work?

When a change is made to sunshine source code, a workflow generates new translation templates that get pushed to CrowdIn automatically.

When translations are updated on CrowdIn, a push gets made to the *l10n\_nightly* branch and a PR is made against the *nightly* branch. Once PR is merged, all updated translations are part of the project and will be included in the next release.

## 17.2 Extraction

There should be minimal cases where strings need to be extracted from source code; however it may be necessary in some situations. For example if a system tray icon is added it should be localized as it is user interfacing.

- **Wrap the string to be extracted in a function as shown.**

```
#include <boost/locale.hpp>
boost::locale::translate("Hello world!")
```

---

**Tip:** More examples can be found in the documentation for [boost locale](#).

---

**Warning:** This is for information only. Contributors should never include manually updated template files, or manually compiled language files in Pull Requests.

Strings are automatically extracted from the code to the *locale/sunshine.po* template file. The generated file is used by CrowdIn to generate language specific template files. The file is generated using the *.github/workflows/localize.yml* workflow and is run on any push event into the *nightly* branch. Jobs are only run if any of the following paths are modified.

```
- 'src/**'
```

When testing locally it may be desirable to manually extract, initialize, update, and compile strings. Python is required for this, along with the python dependencies in the *.scripts/requirements.txt* file. Additionally, [xgettext](#) must be installed.

**Extract, initialize, and update**

```
python ./scripts/_locale.py --extract --init --update
```

**Compile**

```
python ./scripts/_locale.py --compile
```





## TESTING

### 18.1 Clang Format

Source code is tested against the *.clang-format* file for linting errors. The workflow file responsible for clang format testing is *.github/workflows/cpp-clang-format-lint.yml*.

**Test clang-format locally.**

```
find ./ -iname *.cpp -o -iname *.h -iname *.m -iname *.mm | xargs clang-format -i
```

### 18.2 Sphinx

Sunshine uses [Sphinx](#) for documentation building. Sphinx, along with other required documentation dependencies are included in the *./docs/requirements.txt* file. Python is required to build sphinx docs. Installation and setup of python will not be covered here.

The config file for Sphinx is *docs/source/conf.py*. This is already included in the repo and should not be modified.

**Test with Sphinx**

```
cd docs  
make html
```

Alternatively

```
cd docs  
sphinx-build -b html source build
```

### 18.3 Unit Testing

---

**Todo:** Sunshine does not currently have any unit tests. If you would like to help us improve please get in contact with us, or make a PR with suggested changes.

---



**Attention:** This documentation is for informational purposes only and is not intended as legal advice. If you have any legal questions or concerns about using Sunshine, we recommend consulting with a lawyer.

Sunshine is licensed under the GPL-3.0 license, which allows for free use and modification of the software. The full text of the license can be reviewed [here](#).

## 19.1 Commercial Use

Sunshine can be used in commercial applications without any limitations. This means that businesses and organizations can use Sunshine to create and sell products or services without needing to seek permission or pay a fee.

However, it is important to note that the GPL-3.0 license does not grant any rights to distribute or sell the encoders contained within Sunshine. If you plan to sell access to Sunshine as part of their distribution, you are responsible for obtaining the necessary licenses to do so. This may include obtaining a license from the Motion Picture Experts Group (MPEG-LA) and/or any other necessary licensing requirements.

In summary, while Sunshine is free to use, it is the user's responsibility to ensure compliance with all applicable licensing requirements when redistributing the software as part of a commercial offering. If you have any questions or concerns about using Sunshine in a commercial setting, we recommend consulting with a lawyer.